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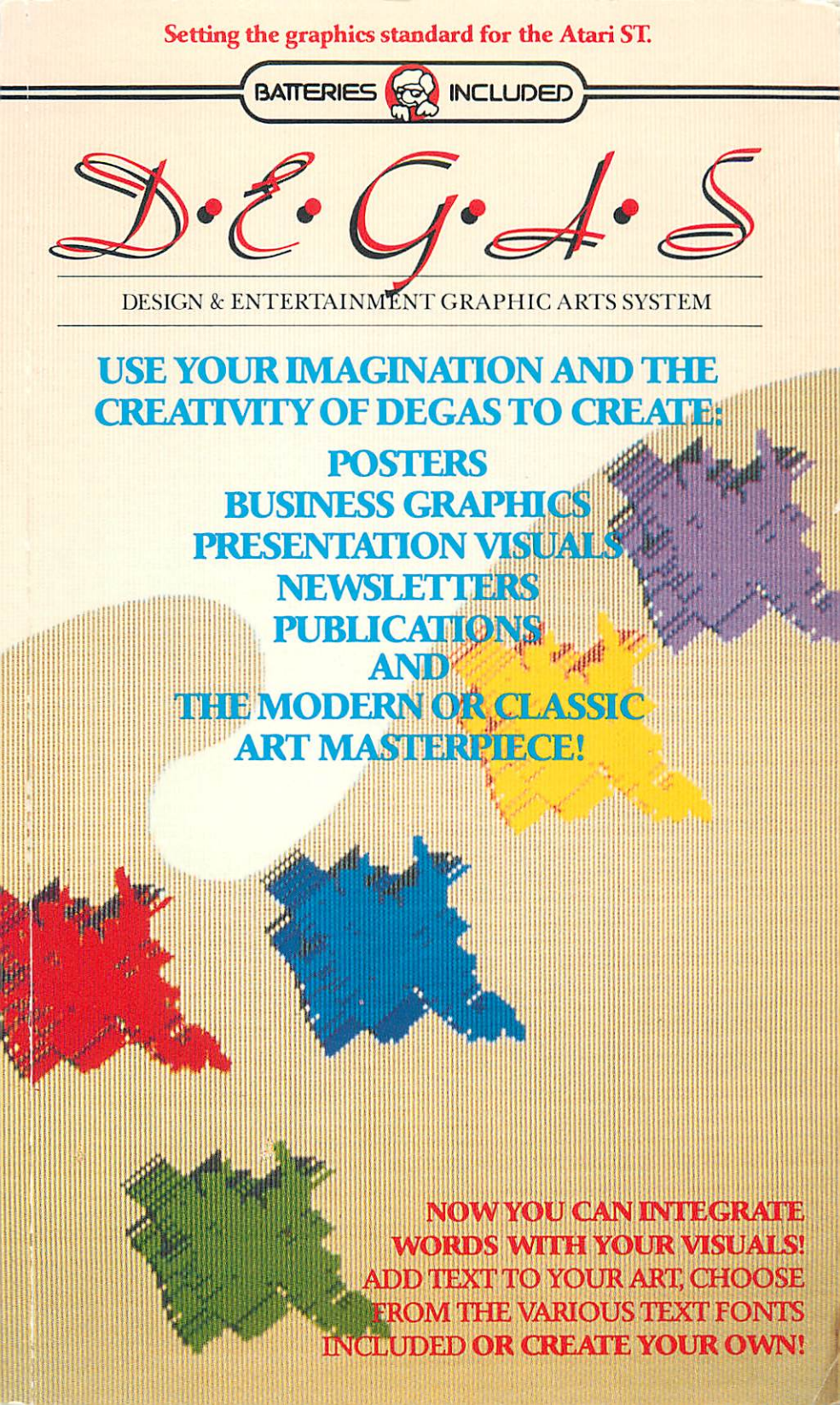

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DESIGN & ENTERTAINMENT GRAPHIC ARTS SYSTEM

for ATARI ST

Programs designed and written by Tom Hudson

Manual written by Ian Chadwick
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Art direction by Martin W. Herzog

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OCTOBER 1985
PRINTED IN CANADA
FIRST EDITION
30 Mural Street, Richmond Hill, Ontario L4B 1B5
Canada Telex 06-218290

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DEGAS is dedicated to my parents,
James and Marian Hudson,
who have always given me their support and encouragement.

ACKNOWLEDGMENTS

No commercial product ever reached the market through the effort of just one person, and DEGAS is no exception. To list all the people who had a part in the development of DEGAS would take several pages, so I'll just mention a few of them here. All who helped with the project have my deepest thanks.

First, I'd like to thank Ian Chadwick, who took on the task of writing the DEGAS manual. Many of his suggestions have been incorporated into the program, making it much easier to use.

Jerry Wolosenko, of Apex Resources, has been instrumental in providing the equipment necessary for the development of DEGAS, without which the program would not exist.

ANALOG Computing Magazine provided the use of their ST equipment when I needed it, and their help in the critical first days of the development phase is deeply appreciated.

Last, but far from least, I would like to thank the Krofchick brothers and the entire staff of Batteries Included, particularly Michael Reichmann, for giving the support and creative freedom I needed to complete the DEGAS project.

INTRODUCTION 1

When I first sat down at the keyboard of the Atari ST and loaded the first, simple graphics demonstration programs, I was astonished by the quality and clarity of both the color and monochrome displays. At that time, there were no programs commercially available for the system, and it simply cried out for a program that would allow users to create colorful images on the screen quickly and easily. That evening, I began work on the program that would eventually become DEGAS.

My purpose in writing DEGAS is to provide an easy-to-use interface that will allow you, the user, to create pictures, diagrams, charts and so forth with a minimum of effort. DEGAS uses a number of the ST's special graphics capabilities to give you a great deal of flexibility in creating images with both the color and monochrome monitors available for the ST.

What can you do with DEGAS? Take a look at the pictures on the disk to get an idea. From recreational drawing to business slide presentations to technical illustrations, DEGAS will help you convey your ideas and emotions through your computer. Ultimately, the only limit to what you can create with DEGAS is your imagination.

The most rewarding experience for a computer programmer is to see the benefits others receive from his or her programs. Many times, however, the programmer does not actually see the results of his or her work, and that's a shame.

With DEGAS, I will have the rare opportunity to see what people are doing with my program, through computer bulletin boards and user group disk libraries. I hope you enjoy using DEGAS as much as I will enjoy seeing the pictures you create with it.

Tom Hudson

INTRODUCTION 2

As a writer and reviewer with several microcomputers usually at hand, I get to work with hundreds of programs a year; programs of every variety: applications, games, tools, text and word processors, graphics, business and more. After a few years, one tends to become somewhat jaundiced towards most of them: you just get to see it all too many times over.

DEGAS is a refreshing and delightful change. Not only is it an excellent program which does all it promises, but it provides hours of pleasure and entertainment to the user. From somewhere in the paleozoic of my childhood memories, I dredged up all sorts of lessons on art and drawing and practiced them for the first time in years as I worked on this program. It was a real joy and I know you'll find it as enjoyable an experience as I did when you begin.

Tom Hudson—the program's author is a glutton for punishment; he worked with a singleminded dedication to finish this program in order to get it out before the end of 1985. More important, he was an attentive, dedicated programmer who listened to comments and suggestions from his beta testers and this author. That is too often a rarity in this business.

The result is DEGAS; one of the best programs I've had the opportunity to work with. I am honored and pleased to have been a part of this project and I can only hope my pleasure will be shared by you when you work with it to create your own masterpieces. I look forward to seeing your art grace the pages of many magazines soon!

Ian Chadwick

INTRODUCTION 3

Any commercial artist working today has certainly felt the impact of computer graphics in their field. Unfortunately access to the equipment has been restricted or costly and the technology has always appeared intimidating to those of us accustomed to working with pencil, ink and paint. The result of course is that many talented artists feel they cannot control this new medium and are being left behind as computer generated imagery becomes more and more prevelent.

The DEGAS program and the Atari ST provide us with an easy and affordable opportunity to tame this beast. With it one can learn the basic principles of computer graphics. We no longer need to feel helplessly dependent on technicians to allow us to participate in this area. We can, at last, do it ourselves.

DEGAS is also useful in preparing business graphics, maps, illustrations —all manner of things. The only limitations are those of our own resourcefulness.

I highly recommend this program to any artists who are unwilling to let this field of graphic design pass them by.

This is for us!

Dean Motter
Art and Design Consultant

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GETTING STARTED

DEGAS—Design and Entertainment Graphics Art System—is a sophisticated graphics and drawing program written by Tom Hudson for the Atari ST. It works in and supports all three resolution modes, so no matter which monitor you have, you can use DEGAS to produce art and graphics. You can then save your picture to disk or print it on your printer. DEGAS works with one or two disk drives.

When loading, your ST will ask you to insert your A and B disks into the drive if you have a one drive system. Before you use DEGAS, you should read your ST manual to become familiar with using the menus, loading programs, making copies, the disk and other features of the machine.

1.1 Backups

Batteries Included and the author both believe that you—the buyer of this program—should be able to make backup copies **for you own use**. DEGAS is not protected, so before you use it, you should make a backup copy of the program on a blank, formatted disk. Making copies and formatting disks are explained in your ST manuals.

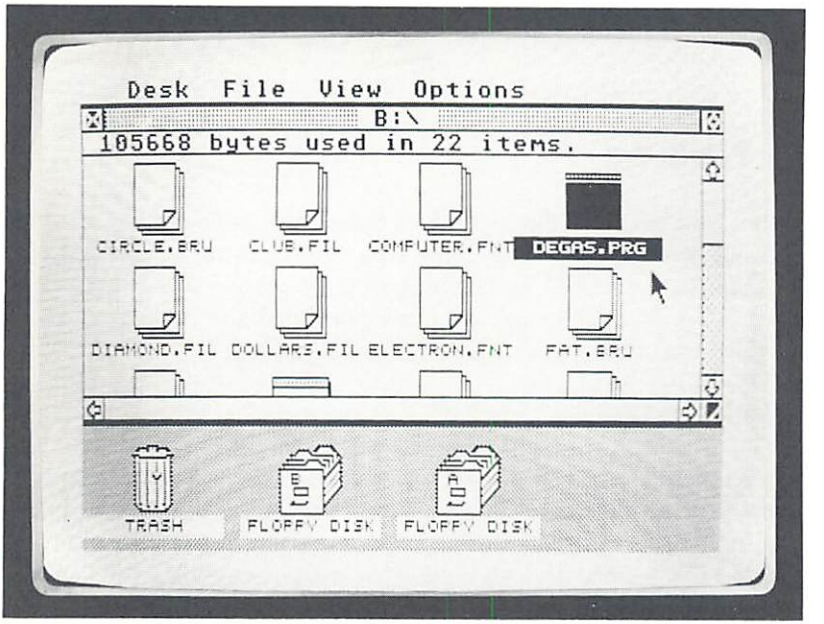
PLEASE NOTE:
Because you can backup the program, we expect you to respect the copyright and not give away or sell or even lend copies of this program to others. *You*, the buyer, are the only authorized user of this program. The author spent many hours designing, developing and writing this program. His income depends on sales of this program; pirate copies hurt him—an individual just like you who must work for his living. Many other people worked hard to make sure it worked properly, to test it, to write the manual. Pirate copies also make their efforts less valuable. Please don't make or accept a pirate copy of this program. Piracy is theft, just like shoplifting or burglary and just as illegal in the law.

1.2 Loading DEGAS

First, turn on your Atari ST, disk drive(s) and monitor.

If you have TOS on Disk, read this paragraph. If you have one disk drive, place your TOS disk in the drive. When the ST asks for disk B:, eject the TOS disk and place your DEGAS disk in the drive. If you have two disk drives, place the DEGAS disk in the second drive. Later, when you want to save pictures, you can eject the DEGAS disk and put your formatted work disk in the drive.

GEM desktop



If you have TOS in ROM, then place the DEGAS disk in the first drive and a formatted work disk for saving pictures in the second drive.

If you have a monochrome monitor, you can simply run DEGAS as is. However, if you have a color monitor, you should select your resolution mode through the 'set preferences' feature in the Gem 'OPTIONS' pull-down menu. You must set your prefered resolution before you load DEGAS, since you can't switch once you're running the program. Low resolution — the default mode—is 320 by 200 pixels with a choice of

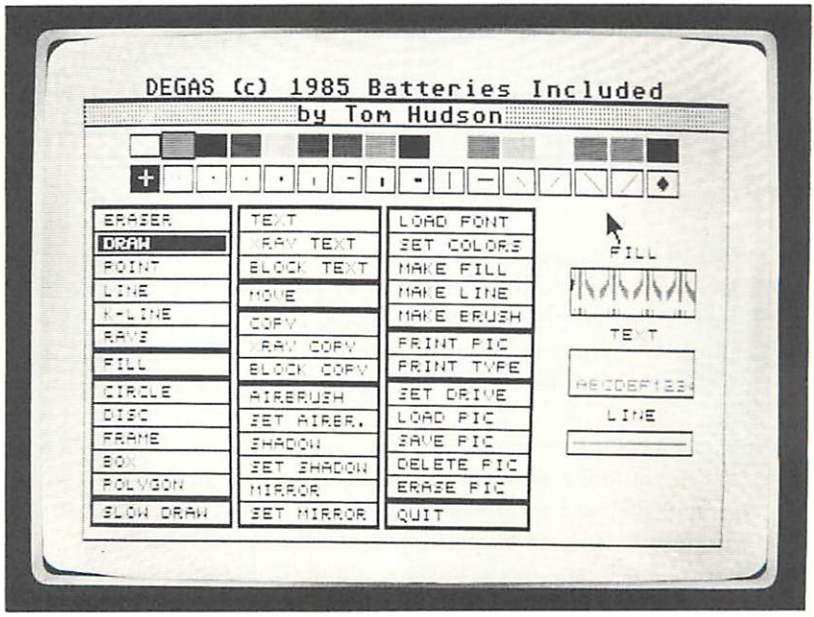
16 colors. Medium is 320 by 400 pixels and four colors. High resolution is 640 by 400, black and white and only obtainable by a monochrome monitor.

When the screen display shows you the contents of the disks (you may have to "open" a floppy disk to see the display, explained in your ST manual), move the cursor (the figure on the screen you move with your mouse—usually an arrow but also a brush shape when drawing) to the icon named "DEGAS.PRG" and press the mouse left button twice. You can also use the "open" menu command to load DEGAS. The program will load.

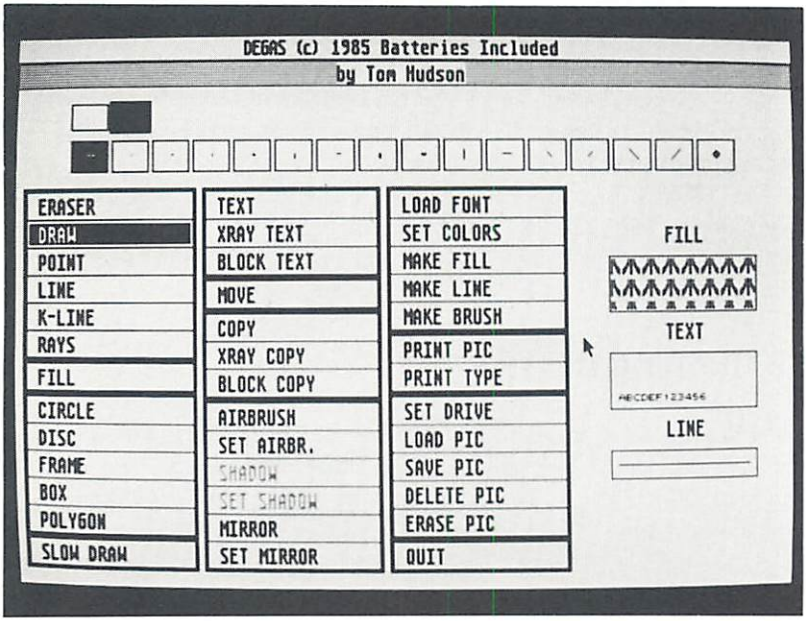
1.3 Running DEGAS

When you boot the program, you first see the menu screen with the list of commands, colors, fill patterns, fonts, lines, brush shapes and features DEGAS offers. To get the drawing screen, simply press the right mouse button; to get back to the menu, press it again.

DEGAS main menu screen (high res)



DEGAS main menu screen (low res)



The mouse is used to control all drawing features. To select a feature from the menu screen, you simply position the cursor over it and press the left mouse button. In the drawing screen, the left mouse button anchors the cursor once you have positioned it and activates the feature chosen previously. In many cases, the right button cancels the feature before it is made permanent. Pressing the left mouse button after something has been drawn accepts it as part of the picture.

The cursor in the drawing screen is always the current brush shape. You select one of the 15 default brush shapes by positioning the cursor over the desired shape and pressing the left mouse button. The 16th brush box can be used by you to design your own shape. When you select a brush shape, the brush box colors are inverted to highlight your choice.

In hi-res or monochrome mode, you have only two 'colors': black and white. When you draw or build a shape in this mode, you must do so in the color *opposite* the background or the image won't show. You can select the color to draw in by positioning the cursor over the color palette box and pressing the left mouse button. Doing this also inverts the colors in the fill, text and line boxes and outlines the color chosen.

The background color is the leftmost box on the color palette; the cursor color, the menu screen text and outline color is the rightmost box. All other boxes are foreground colors.

All of the features of DEGAS will be described in detail. Some of the features have different effects from one resolution to another; most of this will be obvious when you use the program.

LEARNING TO DRAW WITH DEGAS

2.1 The Menu Screen

Take a look at the menu screen. Across the top you'll see the available colors: 16 in low res mode, 4 in medium res and two (black and white) in high res mode. We'll explore how you can change these colors to suit your own needs later. Below the color boxes are the brush and pen shapes. On the lower left are the graphic command boxes and to the right the current fill pattern, text and line pattern.

When you move your cursor into a feature box and press the left mouse button, the box is highlighted, indicating you have chosen that feature. When you select a color, the fill, text and line pattern change to that color.

Brush and color selection is essential to your drawing. Whatever you draw in DEGAS uses the color and brush shape you select in the menu screen. Many features also use the line and fill patterns. Some require you to press and hold the left mouse button, others to press the left mouse button and release it. Most of the time, the UNDO key will erase the last thing you've drawn, copied, moved or written, but *only if you haven't left the drawing screen*. Other keys are used for effects not listed on the menu screen. This is all described in the sections which follow.

2.2 Leaving DEGAS

The last box on the rightmost column is quit. That's the only good way to leave DEGAS to get back to the desktop. When you quit, the program asks you to confirm it by pressing the mouse button in the box. Never quit by simply turning the computer off with the disk in the drive.

2.3 Drawing Modes

The drawing modes are used for free-hand sketching and irregularly shaped lines. Once you select either draw or point, press the right mouse button to enter the drawing screen. In any draw mode, the shape of the cursor is that of the brush shape shown on the second line below the color palette. The leftmost shape—the cross—will give a one point wide and high line; it's easier to align your images with the crosshair than some of the other shapes.

Choose a color to draw in by clicking the mouse when the cursor is over the correct color box at the top of the screen. If you choose the same color as the background, you won't be able to see your drawing. Changing the color palette is described below.

Choose a brush shape from the fifteen available; your lines and figures will be drawn with the shape and thickness of the brush you select. Creating a sixteenth brush shape of your own is described in the chapter on customizing.

2.3.1 Draw

Use the mouse to position the cursor and hold down the left mouse button. Your drawing will start at that point. Keep the mouse button held down and move the mouse; the line you draw follows the cursor. If you want a different line width, return to the menu screen and select another brush shape by clicking the left mouse button when the cursor is in the desired shape.

You can undo the line if you make a mistake. The UNDO key on the keyboard will erase the line drawn from the last left mouse button press. If you draw several lines, it will only erase the last and only if you don't press either mouse button before you press UNDO.

2.3.2. Point

Point works the same as draw except that each press of the left mouse button leaves a single point on the drawing screen the same size, brush shape and color of the cursor. Point isn't used to draw a line, just single images of the brush shape. You can populate the screen with images of your custom brush shape—say a small figure like you'll find in the brush file 'MAN.BRU'.

Use UNDO to erase the last point drawn.

2.4 Lines

Lines extend straight in any direction from the first cursor location where you press the left mouse button to where ever you move the cursor and press the button again. They use the color and brush shape like the draw modes above, but also use the line pattern. To change the selected pattern, move the cursor to the box on the right of the screen and press the left button. You can cycle through the available patterns by pressing the left mouse button.

Experiment with the different combinations of brush and line shapes before you do any serious drawing.

2.4.1 Regular Lines

To draw a straight line, position the cursor at the place on the screen where you want the line to begin and press and release the left mouse button. Now move the cursor to the position where you want the line to end. You'll see that a "shadow" line attaches both points to indicate the position of the line when drawn. The shadow also shows you the current line pattern. When you press the left mouse button again, the line is drawn between the two points.

Press UNDO to erase the last line drawn if you make a mistake before you press either mouse button.

2.4.2 K-Lines

K-lines are continuous lines; they work exactly like regular lines but don't stop when you press the left mouse button. Instead, the line continues from the last point where you pressed the left mouse button. K-lines are excellent for drawing graphs or charts where connected straight lines are used for data display.

To stop the K-line feature and move the cursor without drawing a line, press the right mouse button. Press the right button again to return to the menu screen. K-lines are re-activated by pressing the left mouse button again. UNDO erases the last line drawn.

2.4.3 Rays

Rays are straight lines that all have the same start point. Press the left mouse button when you have positioned the cursor where you want the rays to be 'anchored'. Release the button and move the mouse; the shadow line follows. Press the left mouse button again to draw the ray. Move the cursor to the next location and continue drawing rays. The right mouse button cancels the ray feature; a second press returns you to the menu screen. Rays are re-activated by pressing the left mouse button again. UNDO erases the last ray drawn.

2.5 Airbrush

Airbrush is a special drawing mode; it paints a swatch of color on the screen like a can of spray paint, the color of the selected paint palette. This is especially useful for adding shading to three-dimensional objects like spheres.

When you draw with the airbrush, you do so exactly as you would in draw mode; with the mouse and the left mouse button held down. Like a spray can, airbrush continues to spray in one area as long as you hold down the button. If you don't move the cursor, then you get a round dot of color. The faster you move the mouse, the fewer drops hit the screen; the slower, the thicker the paint. The paint is applied randomly just like a spray can. Slow draw works with airbrush to increase the paint flow in the cursor location.

Airbrush works in draw mode only and has it's own brush shape; only the color selection affects it. You'll find out how to change the airbrush size and paint 'flow' in the chapter on customizing. Airbrush works with shadow and mirror features as well (but not both together). Airbrush also works like the point mode, placing a random group of dots in the cursor area when you press the left mouse button and release it quickly. To turn airbrush off, click the cursor over the airbrush box again. The UNDO key erases the last spray.

2.6 Mirrors

Like a real mirror, this feature reflects; it duplicates your drawn lines on another part of the screen. This is useful when drawing an image for replication in more than one part of the screen or in creating irregular

but symmetric shapes. It can also be a lot of fun; the mirrors can make your screen like a video kaleidoscope.

The screen can be divided into "mirrors" at the exact center by changing your mirrors, described in the chapter on customizing. If you have a horizontal mirror, then whatever you draw in the left or right half will be drawn in the same relative location in the other half, reversed. A vertical mirror splits the screen into top and bottom and right halves (drawing 'upside down'). A diagonal mirror reflects in the opposite quadrant (a quarter of the screen): if you draw in the upper left, it also appears in the lower right corner. If you combine all three, whatever you draw in one quadrant will be mirrored in the other three.

Mirrors work with all drawing, line and shape modes, although not together with shadow. You'll learn how to set your mirror direction in the chapter on customizing.

2.7 Fill and Patterns

Fill does just that; fills any enclosed area (or the whole screen) with the pattern selected in the fill box in the menu screen.

To choose a fill pattern, position the cursor in the fill box and press the left mouse button to cycle to the next fill pattern. Keep pressing until you find a pattern you want. In the section on customizing DEGAS, you'll see how to create your own fill pattern, replacing the Atari logo pattern in memory. DEGAS has 38 of its own pre-designed fill patterns for you to work with plus several others on disk you can load into memory.

Go to the drawing screen and position your cursor inside the area you want filled. Press the left mouse button. The enclosed space is quickly filled with the chosen pattern.

DEGAS fills an area to the borders and borders have to be solid to prevent the pattern from leaking out into adjacent areas. A border is defined as a color area; DEGAS stops filling when it encounters another color or the edge of the screen. Make sure you have all the gaps sealed before you fill an area; use the magnify mode to inspect the border if you think there may be a hole. You can always erase the last fill before you return to the menu screen or press the left mouse button, by pressing UNDO on the keyboard.

The fill pattern in high res mode is either white on black or vice versa; selected by choosing the color from the palette bar. If you also change the background with set color, you may find fill doesn't have the right effect or doesn't appear to work properly. It's working all right, but you just need to go back to the menu screen and select the proper color in order to display the fill pattern properly.

In color mode, you select the fill pattern color by choosing one of the colors in the palette. You cannot fill an area with a pattern of the same color; your area and fill patterns must have different colors.

Fill works like the 'X-ray' text feature; it will fill over a pattern and still allow the background material to show through. This allows you to combine several fill patterns for a new effect, as long as there are gaps for the pattern to leak through. Remember that a fill stops at any border.

If you hold the CONTROL key down before you press the left mouse button to fill an area, the fill pattern will be solid in the selected color instead of a pattern. UNDO also erases the solid fill if necessary.

2.8 Geometric Shapes

Geometric shapes are regular, symmetric shapes like circles or squares. These shapes can be either outlines (circle or frame) or solid (disk or box). If solid, they can be filled with a color or the current fill pattern.

2.8.1 Circle and Disc

Outlined circles and ovals are easy to draw with DEGAS. Simply position the cursor where you want the center of the shape to be. For accuracy, you might want to draw a single pixel point at that location first, so you can align the shape properly with the rest of your drawing (use the empty pixel in the crosshair brush pattern for alignment).

Now press the left mouse button in the drawing screen. Move the mouse in any direction; the circle or oval expands in the direction you move the mouse. The cursor remains visible in the leading edge of the outline box to show you which way you're moving. The outline box is merely to help you position the circle in your drawing.

Press the left mouse button again: the circle remains in place and the outline box disappears. The circle or oval is fixed in that location; the

right button erases it before you press the left button. A circle is not affected by the line pattern but is by the brush shape; the outline assumes the thickness of the brush shape. You select a brush shape by clicking the left mouse button when the cursor is positioned over the desired shape in the menu screen. Circles may be plotted with a portion of their outline 'outside' the screen area; DEGAS will clip the outside but draw the rest.

If you want a **perfect circle**, not an oval, then press and hold the ALTERNATE key before you press the left mouse button to draw your circle. Now when you move the cursor, it will only go to locations which insure you draw a circle, not an oval. Release the ALTERNATE key and press the left mouse button to set the circle. UNDO erases it.

A **disc** is merely a circle filled with the selected color and fill pattern. It is drawn the same as circle except it is not affected by brush shape. It will not appear filled until you press the left mouse button to fix it. When you fix it, the circle fills with the current fill pattern. If you press and hold the SHIFT key before you press the left mouse button, the disc is outline as well as filled. The outline is always the same color as the fill pattern. If you want the disc filled with a solid color rather than a pattern, press and hold the CONTROL key before you press the left mouse button.

A disc is painted over any color or drawing material underneath it; it works like block copy to fill above any other material on the screen. You 'undo' a circle or disc with the right button before you press the left mouse button to fix it. If you press the left button and fix it, use the UNDO key to erase it.

2.8.2 Frame and Box

A frame is a square or rectangular outline. You draw it exactly as you draw a circle; position the cursor where you want one corner of the box to be drawn. Now press the left mouse button and drag the mouse to enlarge the frame. The cursor appears at the leading corner to indicate direction. Press the left mouse button again to fix the frame or press the right button to undo it.

A frame is affected by both line pattern and brush shape. You can select a different line shape by positioning the cursor in the line box of the

menu screen and pressing the left mouse button to cycle through the available patterns. Experiment with combinations of both to see what results you can get.

A **box** is a filled frame, like a disc is a filled circle; it uses the current color and fill pattern. You draw it exactly as you would a frame. It doesn't appear filled until you fix it by pressing the left mouse button again. Like the disc, you can create an outlined box by holding the SHIFT key before you press the left mouse button to fix the image. You can also fill the box with a solid rather than a pattern by pressing and holding CONTROL before you press the left mouse button.

You can also draw a frame or box with **rounded corners**; simply press and hold the 'ALTERNATE' key before you begin drawing. The rounding won't show until you press the left mouse button to fix the box. Rounding can be used with SHIFT or CONTROL keys for outlined or solid fill.

Like disc, a box paints over anything drawn below it. You 'undo' a frame or box with the right mouse button before you press the left mouse button to fix it or the UNDO key after it has been fixed.

2.9 Polygons

Polygons create irregular filled shapes. You draw a shape just like you use K-line; each press of the left mouse button starts a new straight line from the current cursor position. The right mouse button erases the lines and UNDO erases the figure entirely.

Polygons work slightly differently than K-lines, however. Once you have drawn all but your last connecting your line, press RETURN. This connects your starting point with the last point where you press the left mouse button by a straight line and fills the area with the current fill pattern and color (no need to press and hold the ALTERNATE key). If your lines overlap or cross, there will be areas which don't get filled.

To get an outlined polygon, press and hold SHIFT before you press RETURN. To fill a polygon with a solid color rather than a fill pattern, press and hold the CONTROL key before pressing RETURN.

2.10 Slow Draw

DEGAS is a fast drawing program; sometimes too fast when you're trying to be careful. In order to make things like aligning geometric shapes easier or in positioning the cursor in magnify mode, choose slow draw in the menu screen. To turn it off, return to the menu screen, press the left mouse button when the cursor is again in the slow draw box. Slow draw works with all DEGAS drawing and text features.

2.11 Magnify Mode

Magnify is a special feature of DEGAS; it expands an area of your drawing to almost full-screen size so you can work on it in more detail. Slow draw also works in magnify mode.

You enter magnify mode from any other mode in the drawing screen and return to that mode when you're finished. To engage the magnify feature, go to the drawing screen by pressing the right mouse button (if you have a blank screen, then draw a bit or load a drawing in first). Press the F1 key—the first function key in the line of keys at the top of the keyboard. To cancel, press the right mouse button.

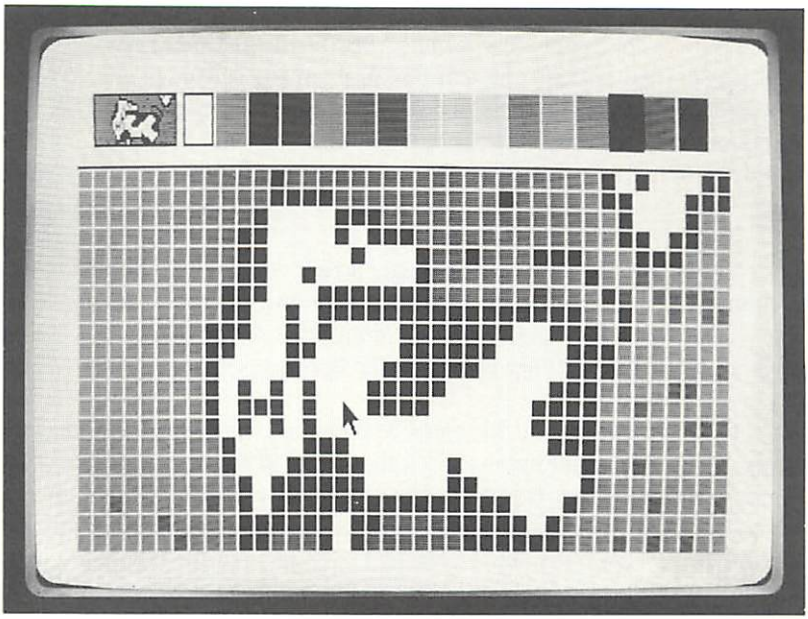
A small rectangle will appear on the screen; this is the definition box; it frames the area of the picture to magnify. Use the mouse to move it around your drawing so the area you want to work in is inside the frame. Now press the left mouse button.

The area you selected is magnified to take up almost the entire screen. At the top, on the left, is the area you're working on in real size. Along the top in low and medium resolutions, is the current color palette—this palette only affects the magnify mode screen; it doesn't change the color you're working with in regular drawing mode.

Each square in the magnified picture is one pixel large, no matter what the resolution. To change a pixel—draw in the magnify mode—move the cursor to the pixel and press the left mouse button. The pixel becomes the color you selected from the palette (in high-res mode it changes from black to white or vice versa).

If you keep the left mouse button held down, you can draw in magnify mode in the selected color just like the draw mode. UNDO in the magnify screen returns all of the the pixels changed to their original color, not merely the last few changed, so be careful when using it.

4: Magnify mode screen



Watch the upper left corner to see how your changes affect the real drawing. Magnify is very good for adding detail, for smoothing large text, touch up and erasing small areas of the screen.

To return to the drawing screen, press the right mouse button. You can then move the definition box to another location and magnify it or press the right mouse button again and return to the mode you were drawing in previously.

2.12 Shadow

Shadow duplicates each plotted point you draw a set number of pixels away from the original point, in a color and direction of your choice. It works with draw, point, line, shape and text modes. Shadows can be adjacent or completely separate duplicates, depending on how far away you set them. Shadows are automatically drawn when you choose the shadow feature. With filled figures like disc, box or polygon, the fill is also shadowed 'behind' the original but not visible through it. This is good for creating 3-D effects with solid figures.

UNDO erases the last item drawn as well as its shadow.

2.13 Text

This feature is for positioning a font—text (letters and numbers) or graphics—on the screen. The text box in the menu screen shows you the current text shape, size and color. To change to another text size, simply position the cursor in the text box and press the left mouse button to cycle to the next size (five with the system font, six when you create your own). The color palette is used to change the text color.

You can load a font from disk or create a new one with the Font Editor program and use it instead of the default font; this is described later. When you load a font into memory from disk, it doesn't change anything previously written in text on the drawing screen.

Text uses the ST keyboard for entry; you can use upper- and lowercase letters, punctuation and numbers and the CONTROL key combinations. The BACKSPACE key erases the last characters typed from the right end of the text, UNDO erases the entire text before you press any other mouse button. RETURN starts your text over again at the beginning of the line, overwriting text below it but fixing the characters entered before you pressed RETURN.

You can write up to 80 characters of text in a single line, depending on the actual size of the text. The cursor for text is a large arrow which points to the location where the first character you type will appear.

2.13.1 Block Text

To print your text over the background and overwrite anything below it select BLOCK TEXT, your text color and size, then go to the drawing screen. Position the cursor where you want the text to appear and start typing. You can move the mouse and the text will follow; you can position text anywhere on the screen. When you press UNDO, it erases the entire line as does the right mouse button. The left mouse button fixes the text at the cursor location.

2.13.2 X-Ray Text

X-ray text works just like block text, except that it leaves the background intact beneath it. This means you can write over one color with another or fill a colored area with text in the background color.

A commonly used technique is shadowed or 3-D letters. This can be done very simply by using a shadow of a darker color with text. (See shadow, above)

2.14 Copying and Moving

DEGAS has a very powerful ability to cut and copy sections of your picture. You can copy a portion from one area to another, copy the same part several times or move a section around to another location on the screen.

To copy a portion of a drawing, select copy in the menu screen and go to the drawing screen. Place the cursor in the upper left corner of the area you want to copy. Press the left mouse button and hold it down while dragging the expanding box down and to your right. The area inside this box will be copied or moved. The copy box only moves down and right from the cursor location. Now release the button when you have enclosed the area you want to copy or move. This fixes the copy box. If you press the left mouse button while the cursor is outside the box right now, it undoes the copy box.

Move the cursor to any location inside the box, press and hold the left mouse button. Keep the mouse button held down and move the cursor; the area in the box is copied and moves along with the copy box. Move the box to the new location where you want the copy and move cursor outside the box. Press the left mouse button and the area is copies to its new location and fixed there.

The right mouse button cancels the copy box before you fix the copy. A second press of the right button returns you to the menu screen. UNDO also erases a copy or move before you press another mouse button.

2.14.1 X-Ray Copy

X-ray copy makes the background "transparent" in the copy box and lets the drawing underneath show through. This is useful for creating your own patterns; you can copy one filled area over another with unique results!

The background color is made transparent in low and medium resolution modes, but the other colors are not, so they cover whatever color they

are placed over. The background color in DEGAS is indicated by the leftmost box in the color palette in the menu screen.

2.14.2 Block Copy

Block copy is the second copy mode, selected in the main menu screen after you choose copy. It copies exactly like X-ray except that the background is not transparent, so it covers up anything beneath the copy box.

2.14.3 Multiple Copies

You can make more than one copy of the same area very simply with DEGAS: simply create the copy box as described above and move it to the new location. Now press and hold the SHIFT key. Move the cursor outside the copy box as usual and press the left mouse button. This duplicates the copy box below its current position but still allows you to pick up the box and move it to another location and copy it there as well. The SHIFT key must be held down when you press the left mouse button to make multiple copies. This feature works equally well with X-ray and block modes.

2.14.4 Moving

Move works just like block copy except that it picks up the rectangle you define with the mouse and cursor and doesn't leave a copy of it behind when you pick it up to move. You define the rectangular area to be moved, then move it. When you press the left mouse button, the area is fixed in its new location and the area where it was previously is returned to the background color.

You cannot make multiple copies with move like you can with copy and it always works like block copy, not X-ray. To cancel move, press the right mouse button before you press the left. To return the section copied back to its original location and erase it at its new spot, press UNDO.

2.15 Erasing

2.15.1 Erasing a Screen

It's easy to erase a whole screen; simply select the erase pic feature in the menu screen, You'll be asked to confirm it by positioning the cursor over the "OK" box in the window that pops up and pressing the left mouse button. Be careful; you can't 'undo' an entire screen erase!

2.15.2 The Eraser

There are several ways to erase a small section of the picture; one method is to draw over the area you want to delete with the background color. This is suitable for small areas, especially when using the magnify mode. Another way is to use block copy and copy a piece of the background over the area, if it can be done without ruining other parts of the picture as well. In some cases, you can simply draw over top of the part.

The eraser works just like the brush in draw; you select the brush shape in the menu screen but the color is always the background (leftmost box in the color palette). The eraser has a default brush shape, but you can change it by selecting any shape you want.

Eraser works in regular draw mode, even with slow draw but not magnify mode. To erase in magnify mode, simply select the background color and click on the pixel you want erased (in hi-res mode, simply click on the pixel; it will toggle to the opposite color).

To cancel the most recent eraser, press UNDO before you press any other keys or mouse buttons.

THE DISK AND PRINTER

3.1 The Disk

When you save, load or delete a picture file from disk, DEGAS produces a window which shows you the current disk and folder you're using and a list of any pictures on disk in the current resolution mode. The directory of pictures has scroll bars which work just like the scroll bars in your desktop. If you're not familiar with using scroll bars, read your ST manual for more information.

Pictures have three character extenders to their names which define the mode: PI3 is high-res, PI2 is medium and PI1 is low-res mode. You don't have to type in the extender; DEGAS will automatically append the correct extender for your resolution mode. If you try to use a different extender, DEGAS will warn you and you'll have to try again. You can't save or load a picture with the wrong resolution mode extender either!

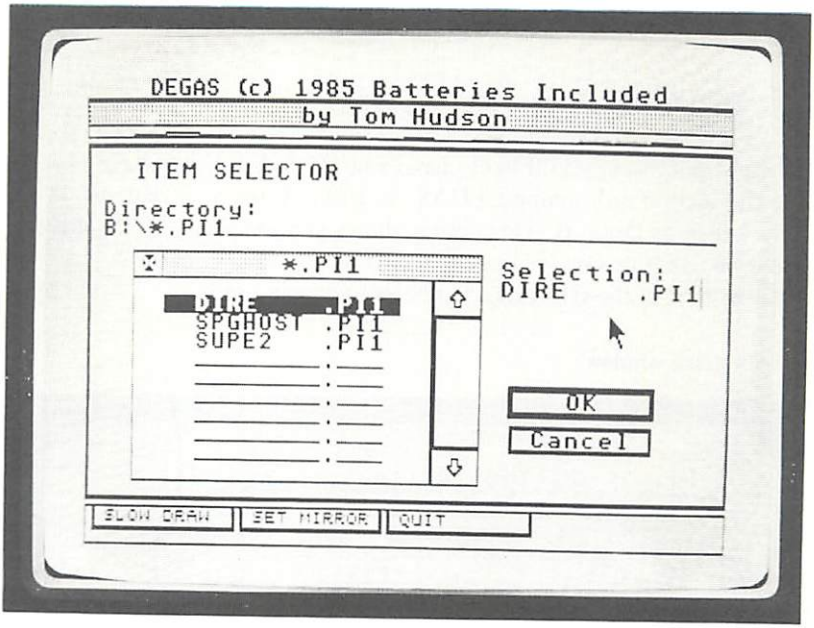
The name of the picture to be saved, loaded or deleted will appear in the space under the word "Selection:" when you either type the name or click on it from the directory. If you want to use this name, move the cursor to the OK box and press the left mouse button. If you want to use a different name, then use the backspace to delete the characters of the name (unless of course it's already blank) and type in the name you want.

You can also move the cursor over to the name in the directory box and double click the left mouse button. This will save, load or delete the picture with that name.

3.1.1 Saving a Picture

To save your drawing to disk, first place your picture disk (disk B) into the disk drive. In the menu screen, select "SAVE PIC'. A window will open showing you all of the pictures on the disk in that resolution mode. Follow the procedure described above for choosing a name for your picture. Be careful: saving a picture with a file name already used causes the one on disk to be erased and written over by the one you're saving now.

Item selector screen with file names



If you save a picture with the same name as one already on disk, you'll be asked to confirm that it's okay to replace the picture on disk with the one in memory.

Make sure you have enough space on your picture disk *before* you load DEGAS.

3.1.2 Loading a Picture

Loading a picture is the opposite of saving one; you call up a picture from disk to the drawing screen. You can only load a picture which matches your current resolution mode, so the directory will only show you those pictures with the proper extender. Loading a picture from disk erases any one currently in memory, so be sure to save your picture first if you want to keep it. You'll be asked if it's okay to load the picture from disk over the one in memory before it happens.

3.1.3 Deleting a Picture

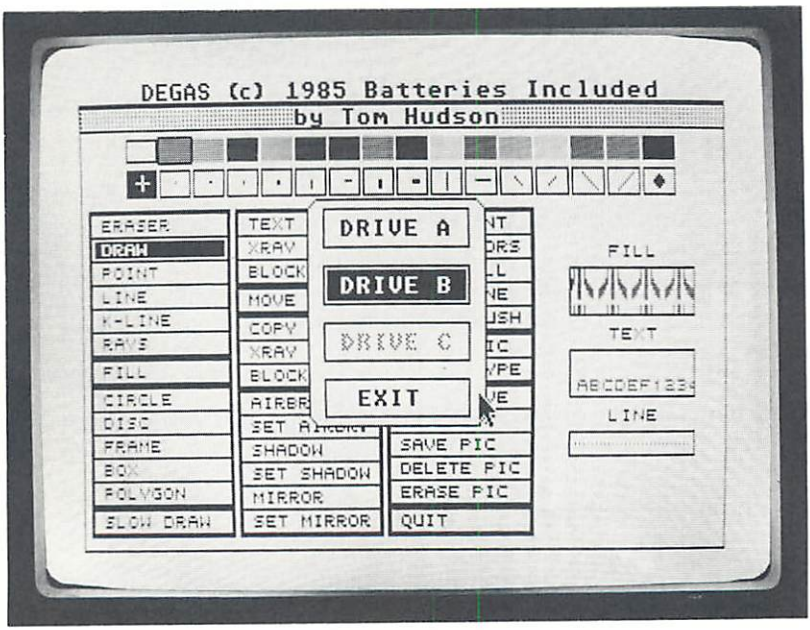
You can delete a picture from disk the same way you save or load one. You can delete pictures with other resolutions. Be careful; deleting a

picture file is irreversible, so make sure you really mean to delete it. Before you actually delete the picture, DEGAS asks you to confirm or cancel the action.

3.1.4 Setting the Drive

For most purposes, you'll likely have your TOS disk if you have one (see the section on running DEGAS) as Drive A and your data or picture disk as Drive B. This option allows you to specify which drive you'll be using to save pictures to: A, B or C. Drive C must be installed first in the GEM desktop before you can use it.

Set drive window



3.2 The Printer

3.2.1 Choosing a Printer Type

There is one printer driver file on the master disk which will allow you to print your artwork on the Epson MX-80 or compatible printer types. To load your printer driver into DEGAS, chose 'Print type' and then select the proper file which corresponds to your printer.

Other printer drivers will be made available in later versions of the program and possibly on CompuServe's SIGATARI. Registered owners will be advised when other disk are available. You can return to the main menu screen without loading a printer driver by selecting cancel.

If you have a 'letter quality' printer or one not capable of graphics, you won't be able to print your DEGAS pictures.

3.2.2 Printing a Picture

To print your picture, make sure your printer type is correctly selected and the printer is properly hooked up and turned on. Select the ''PRINT PIC'' option in the menu screen. Your picture will be printed. Wait for the cursor to return to normal before continuing or removing your picture.

If you are using a typical dot matrix printer with a single color ribbon, you won't get colors in your picture. DEGAS will print the different colors in shades of black and grey.

If you press the UNDO key during a print operation, the print will be cancelled and you will return to the main menu screen.

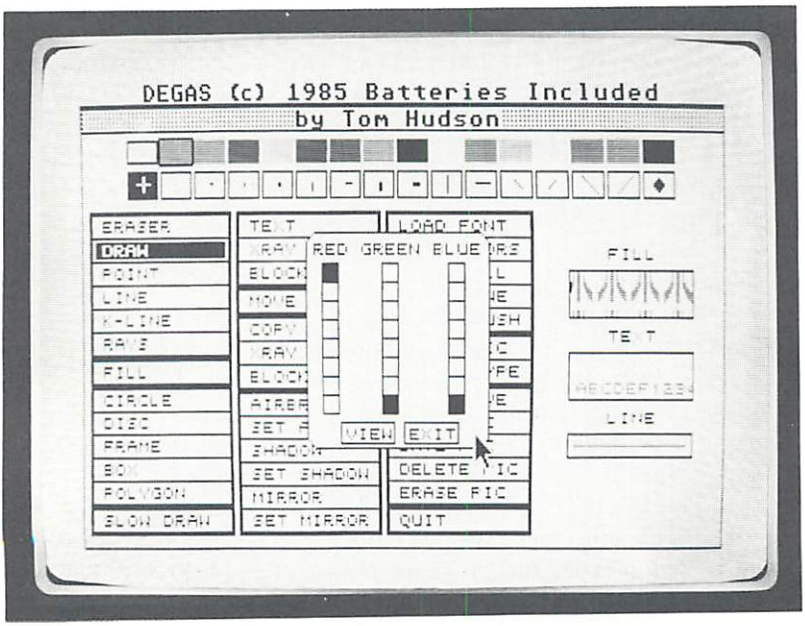
CUSTOMIZING DEGAS

Most features in DEGAS can be altered to suit your own personal style quite easily. All you have to do is position the cursor over the 'set' or 'make' selection for the feature and click the left mouse button. Then you can change, edit or alter the feature as you need.

4.1 Changing Colors

If you own a color monitor, you can use DEGAS in low or medium resolution modes. This means color; 16 in low-res, 4 in medium-res. You can change the colors in any of the DEGAS color palette boxes by positioning the cursor over the color you want changed and pressing the left mouse button. Now select **set color** from the menu.

Set color window



A box appears in the middle of the screen with three color bars; red, green and blue. Each bar has eight divisions to indicate the relative amount of that color is to be added to the selected palette box. The top of each bar represents 100%, the bottom zero. Move the cursor to the

division in the bar and press the left mouse button. The solid box identifying the level jumps to the new division. With 100% of each color, you get white; with zero percent, you get black.

You can change the palette color by moving the cursor to the box and pressing the left mouse button. You can view the effect on your picture by selecting the view box in the window. Every color box—including the background—can be changed. The color changes are saved with your picture. The color you're working on is shown in the palette and the fill, text and line boxes.

If you try to change the rightmost color box to the same color as the background (the leftmost box), DEGAS will stop you. This is to prevent you from losing sight of the cursor and text and boxes in the menu screen. The background and rightmost colors must differ by at least a small amount so you don't get 'lost'.

To return to the menu screen, select the exit box. Set color on the monochrome screen merely toggles between black and white colors.

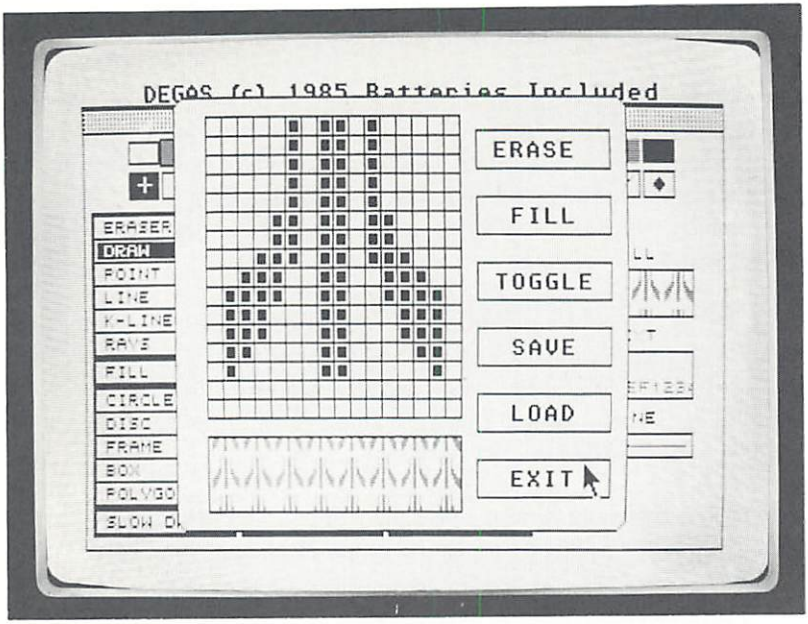
4.2 Changing Fill Patterns

You can replace the first of the 38 fill patterns (initially the Atari logo) with one of your own designs. No matter which fill pattern is currently selected, when you choose 'Make Fill', you alter the first pattern. Select the color you want, although it can be changed later.

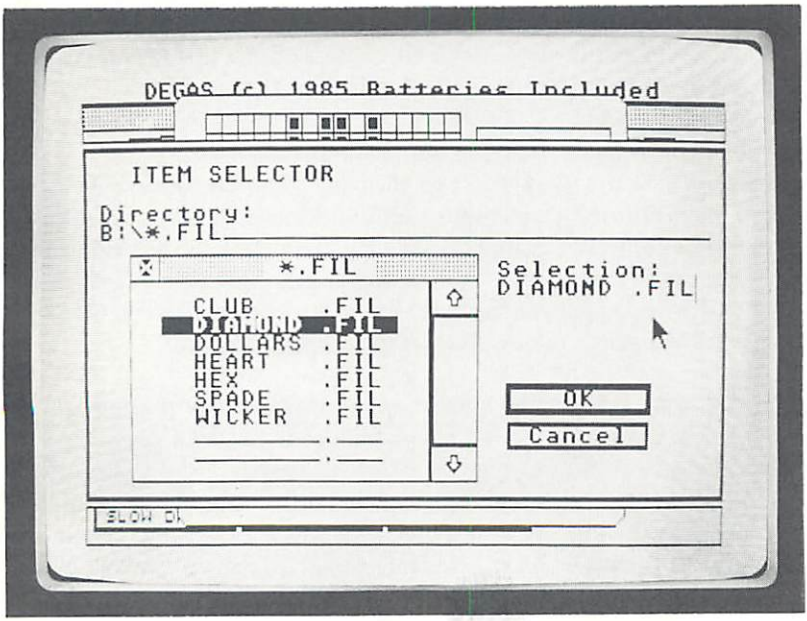
If you've already used a custom or default pattern in your picture, it will remain that way; you won't be changing something you've already used in your drawing. Select **make fill** in the menu. A window will open with a 16 by 16 square grid showing the makeup of one element of the the current fill pattern, several option boxes on the right and a sample of what the fill pattern looks like at the bottom. Each square on the grid is equivalent to one pixel on the drawing screen.

Each box in the grid can be toggled on or off by moving the cursor to the box and pressing the left mouse button. If you hold down the button, the cursor works exactly like it does in magnify and draw modes. You can erase the entire pattern by clicking on the erase box, or fill it completely by clicking on fill. Toggle turns on all those which are off and turns off those on—in effect reversing the fill pattern's image.

Fill pattern edit window



Load fill pattern selector



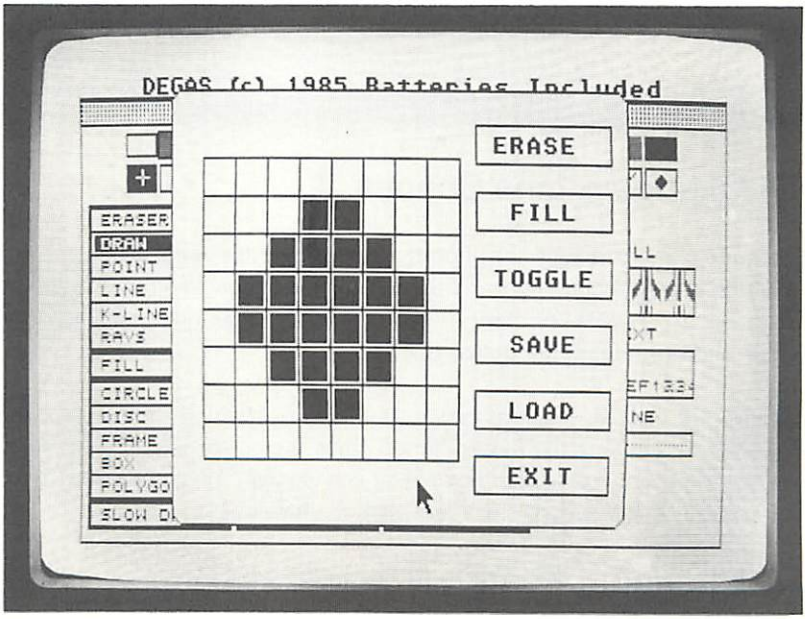
You can save this particular fill pattern to disk the same way you save a picture, except that a fill pattern uses a .FIL extension. You can also load a fill pattern from disk like a picture. Remember that only one pattern at a time is saved or loaded: the first fill pattern in the sequence. Exit takes you back to the main menu screen. If you want to exit without changing the pattern, simply press the UNDO key.

To return to the fill design window without loading, select the cancel box.

4.3 Changing Brush Shapes

The rightmost brush box is available for alteration to your own brush shape, much in the same way you change a fill pattern. The brush shape is actually a box eight by eight pixels; it can be made solid or hollow, with varying effects on your lines and drawings. The change feature is **make brush** on the menu screen.

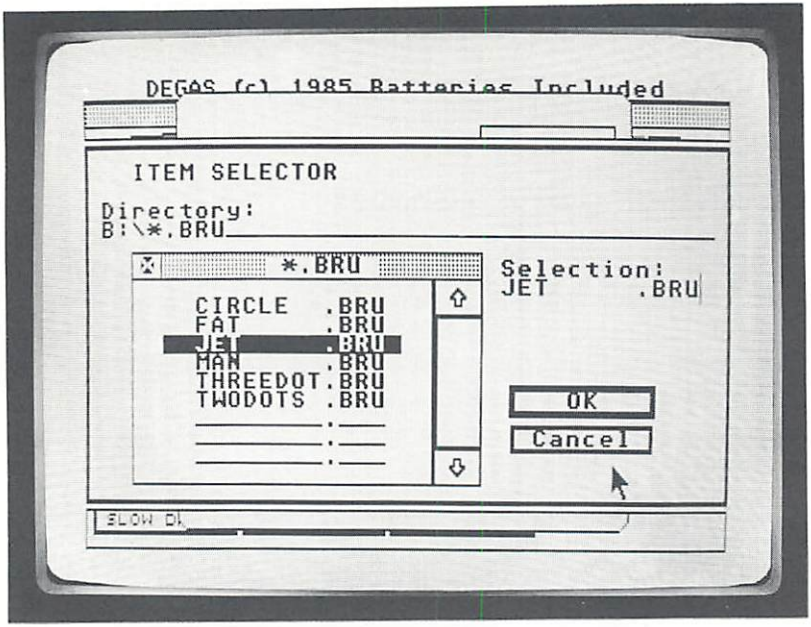
Brush shape edit window



Only the rightmost brush can be changed no matter which shape is currently selected;, but you can load and save brush shapes on disk. Brush shape files have a '.BRU' extension. To return to the main menu

screen without loading, select the cancel box. To return to the menu screen without entering the brush changes, press the UNDO key.

Brush shape load selector



4.4 Changing Line Shapes

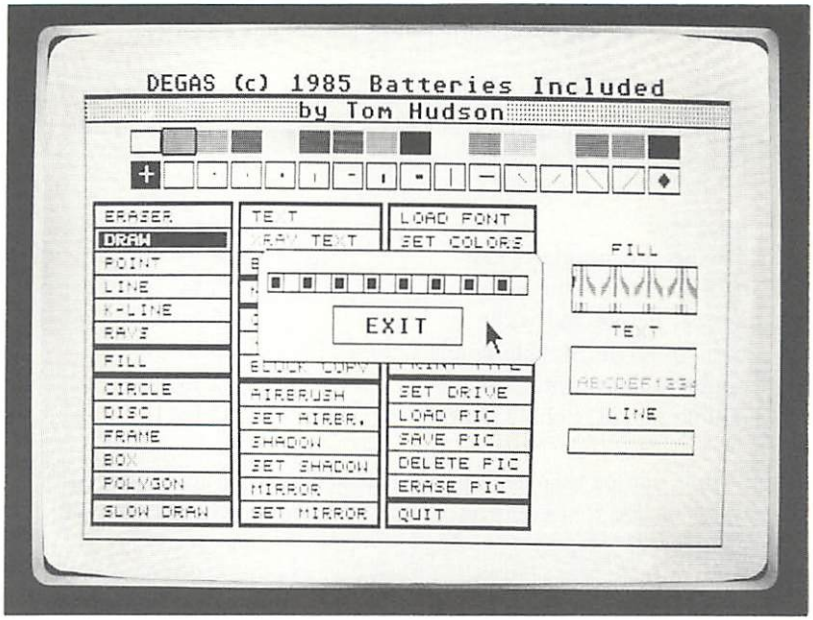
Lines are easy to change; position the cursor over the **make line** selection on the menu and press the left mouse button. You may want to change colors first for clarity. You can only change one line pattern of the eight provided; the dotted line.

Like the fill pattern, a line is constructed of boxes which can be turned on or off by clicking the mouse button when the cursor is over one. In a line pattern there are sixteen boxes you can change. You can't save a line pattern, but it's very quick and easy to change it.

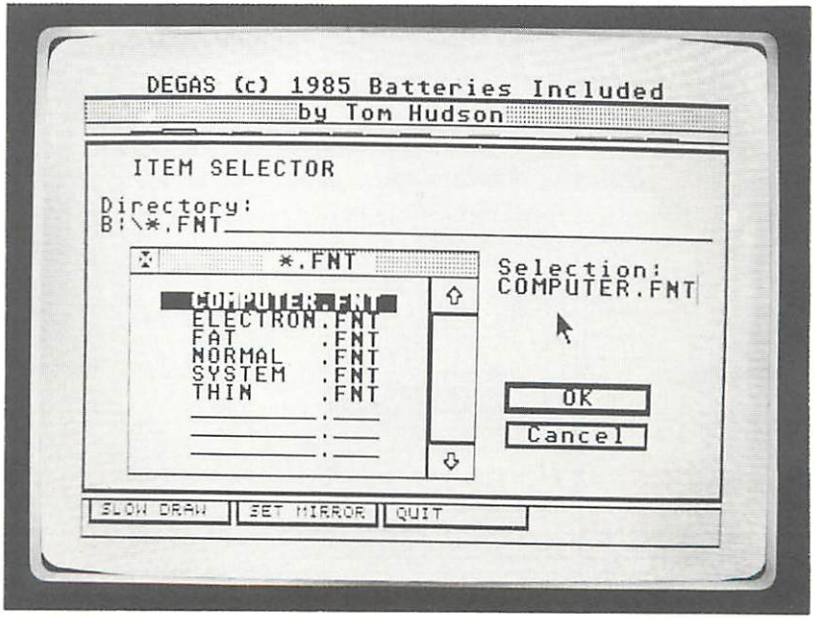
4.5 Changing Fonts

The main ST font is used as a default in DEGAS for text. However, you can load your own font from disk by selecting the **load font** option in the menu screen. Fonts are stored as files on your disk with the .FNT

Line pattern edit window



Font load selector



extender. The SYSTEM.FNT file on the disk is the original font that appears when you load DEGAS; it's not editable by the font editor program; it is only used to return you to the default font style.

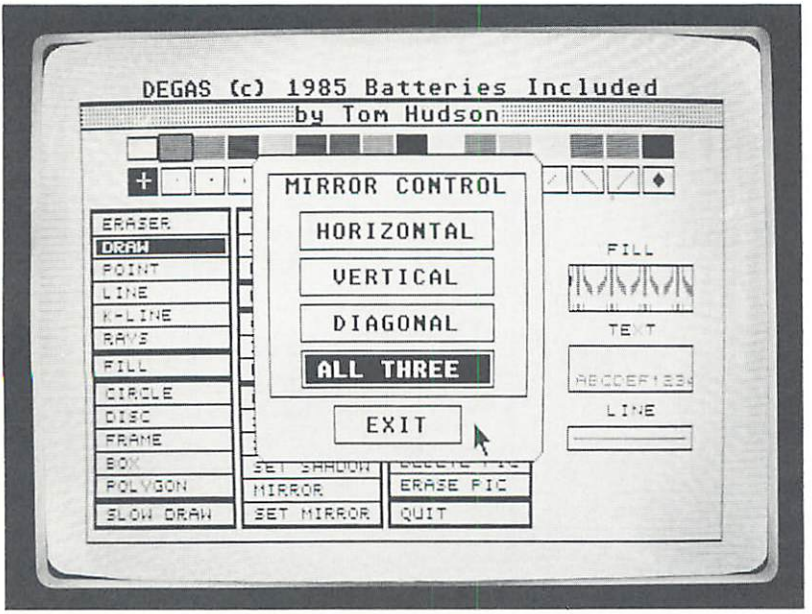
To change a font, simply load it as you would a picture. Fonts can be changed and edited using the Font Editor program provided with the DEGAS disk. Your own or loaded fonts (or text) can have six sizes:

Font size:	Pixel size
half height, normal width	8 by 8
half height, double width	8 by 16
normal height and width	16 by 8
normal height, double width	16 by 16
double height, normal width	32 by 8
double height, double width	32 by 16

Not all fonts can be displayed in the half-height sizes, as explained in the chapter on the font editor program. These fonts will only have the last four sizes for display.

To return to the main menu screen without loading, select the cancel box.

Mirrow option window



4.6 Changing Mirrors

Mirrors can be vertical (so that up and down are duplicated), horizontal (right and left are duplicated), diagonal (opposite quadrants are duplicated) or all three. Simply select **Set Mirror** and chose your option. You can't have horizontal and vertical or diagonal; you must select one or the other or all three together. Mirrors cannot work with shadows, fill, copy, move or text.

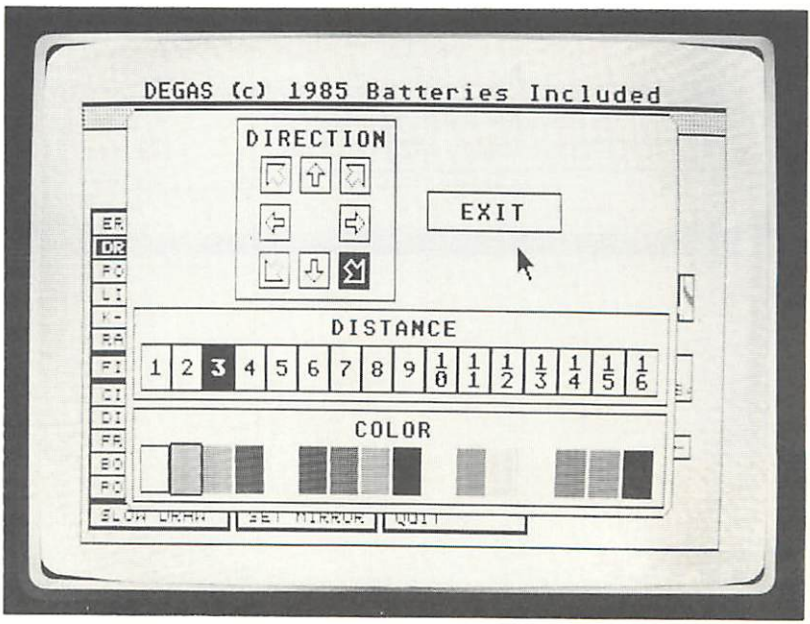
To return to the main menu screen, select the exit box.

4.7 Changing Shadows

Shadows can be directed to follow your drawing in any one of eight directions, up to 16 pixels in thickness and in any color in the palette. Just click on your choice in all three options and the next time you draw with a shadow, it will be implemented. Return to the main menu screen by selecting the exit box. To cancel shadow effects, select the shadow box on the main menu again.

Shadows won't work with mirrors, fill, copy or move.

Shadow option window

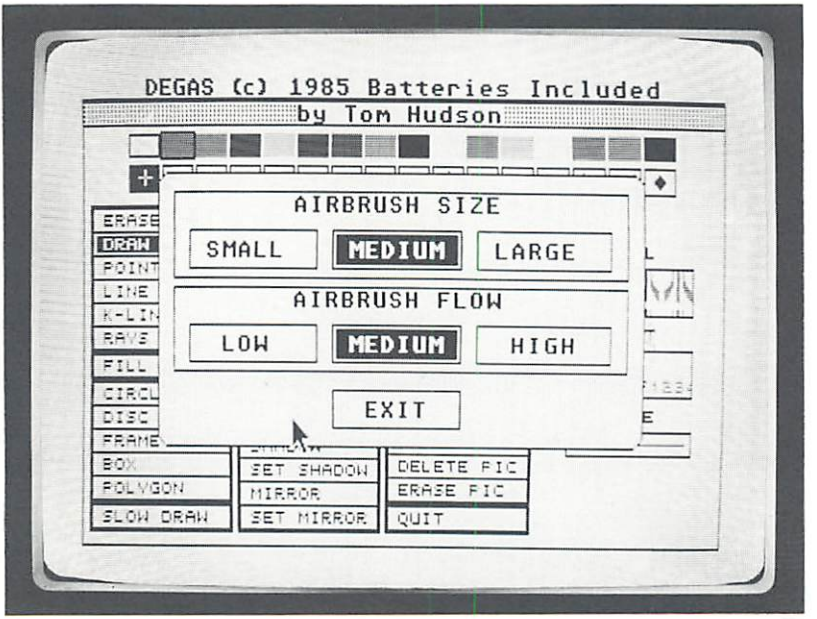


4.8 Changing the Airbrush

Click on the **Set Airbrush** feature in the menu screen. The airbrush has options for size (small, medium and large) and flow (low, medium and high). The default setting is medium in both. Move the cursor over the desired box and click the left mouse button. The size governs the cursor shape—the area where the paint gets sprayed. Flow governs the speed at which the paint fills the space you're spraying.

To return to the menu screen, select the exit box.

Airbrush option window



HINTS AND TIPS

Drawing with DEGAS is remarkably easy. You can create some amazing works of art with a little patience and experimentation. Learn to use all of the features first, before you go on to draw your masterpiece: tinker with different effects from line and brush shapes, test shadows and make your own fill patterns. Every moment you spend getting to know the system will make using DEGAS that much easier when you try your hand at some serious art.

DEGAS is well suited for such things as perspective drawing; you can use the ray feature to draw lines from the vanishing points with ease. Shadows can be added to give extra depth and realism to a picture. Shadows used with large brush sizes are excellent for 3-D effects.

Magnify mode is very useful for cleaning up your pictures and adding that detail which makes the difference between good and great art. Use it to smooth curves, tidy type, add shadowing and when aligning your art to specific points. You can also use magnify mode to carefully erase the center of your text for a 'hollow' type which can be copies back onto a solid copy of itself for a relief effect. Or it can be filled with a pattern for a different density.

When you use the text mode and a particularly large text, you may find the result blocky and not very attractive. With magnify mode, you can simply alter the text after you've placed it on the screen, rounding edges, filling in portions where it is 'chunky'. You can also add thin shading effects to text in magnify mode.

Simple outlines around geometric shapes can make your artwork stand out and look more professional. The same goes for borders; you can create a hollow border with two frames, one inside the other and display it like that or filled with a pattern. You can round the corners by drawing circles centered on the inside frame then erasing the extra for another effect. A simpler method is to hold down the ALTERNATE key when drawing a box; that gives you rounded corners automatically.

If you're trying to draw professional graphics like charts or graphs, you may find it easier to draw a frame around the working area of the screen and then fill it with a grid pattern. Use the grid to align your drawing and shapes, then erase the extra lines when you're done.

If you want to be able to see the drawing screen borders, separate from the background color, then first change the background color (the leftmost box on the color palette) to a color different from that in which you want to work (say a green or blue). Then change another color on the palette to that on which you want to draw—say white. Now exit and choose 'fill'. Go to the drawing screen and fill the entire screen with the last color before you do any drawing. This will give you a clean art area with a distinct border.

To locate the exact center of your drawing screen, select the 'all three' mirror mode and line drawing. Start your line anywhere on the screen and move the mouse so that the line crosses over to the other side of the screen; top and bottom. If you play with the mouse a bit, you'll find the lines intersect at one point only; that's the center. Press the left mouse button to fix the lines when they intersect. You can then use magnify mode to color the center if you wish and the eraser to erase the lines you drew to find the center.

The brush shape can be used to generate special effects; you can change the shape to one you want and use it with point, line or draw, even geometric shapes. The MAN.BRU file is a 'man' brush shape you can use with point to scatter small figures over your screen.

You can create some nice effects using the fill pattern and filling one pattern over another—especially noticeable if the two patterns are different colors. You could create your own fill pattern using only one half of the pattern area and fill a space with that pattern in a particular color. Then create another pattern in the other half and fill the same area with it in a different color. This can be quite striking.

Text display also works with the CONTROL key; press and hold it when entering your text to see what other characters are available for display. There may be more to a character set than you realize!

There are several DEGAS picture files available on CompuServe's SIGATARI (many by Tom Hudson himself) and others will likely be on other bulletin board systems soon. These are useful for filling out your picture library and to give you some ideas for your own art by seeing how other artists have done theirs.

5.1 Problems

One of the first things to make sure of when using DEGAS is that you're not trying to draw or fill using the background color. If you try to draw over one color with the same one, nothing will show!

Remember that you can undo a mistake with either the right mouse button or the UNDO key, depending on the feature you're using.

Examine the space on your disks to make sure you have enough room to save pictures; each picture takes 32K of space on a disk. It's a good idea to make backup copies of your art as you go along—before you try to make changes. That way you always have a copy to work with if something goes wrong.

Not all text can be shown at half-height sizes; your loaded character set may only have four sizes available—an indication that it's not available in half-height mode. This is explained more in the chapter on the font editor program.

It's a good idea to save your picture frequently as you work on it; that way, if you have a power failure or other problems with your machine, your art won't be completely lost.

Keep backup copies of your art on separate disks, even that which is still in the drawing stage. Nothing is more frustrating than losing a picture because of a disk failure.

Finally, make sure you set your screen resolution, mouse click time and key press before you load DEGAS—in the GEM desktop mode. If you find the computer doesn't respond well to the mouse click or key press, try making it either slower or faster and see if that works better.

THE FONT EDITOR

The Font Editor (FONTEDIT.PRG on your disk) is a special bonus feature; it is an editor program which you use to create your own fonts—character sets of letters, numbers and punctuation. Or you can create map symbols, special graphics, international character sets, text or game images for your own use.

Using the font editor is very simple; it works very much like the 'make fill' feature in DEGAS. First, load the program by positioning the mouse cursor on the program icon when in GEM mode and double click the left mouse button. When it loads, you'll see an empty grid at the bottom left corner of the screen; this is a magnified image of a single character; each block in the grid represents one pixel in the selected character. Along the bottom is a real-size display of each character with their system font equivalents above.

You can change the 128 'normal' characters (the first half of the normal ASCII character set) in the Atari character set to anything you want. That's all of the standard letters, numbers and punctuation on the keyboard—upper-and lower-case. Letters pressed with the CONTROL key are along the top line. Letters pressed with the ALTERNATE key however won't show in DEGAS; there is no alternate character set.

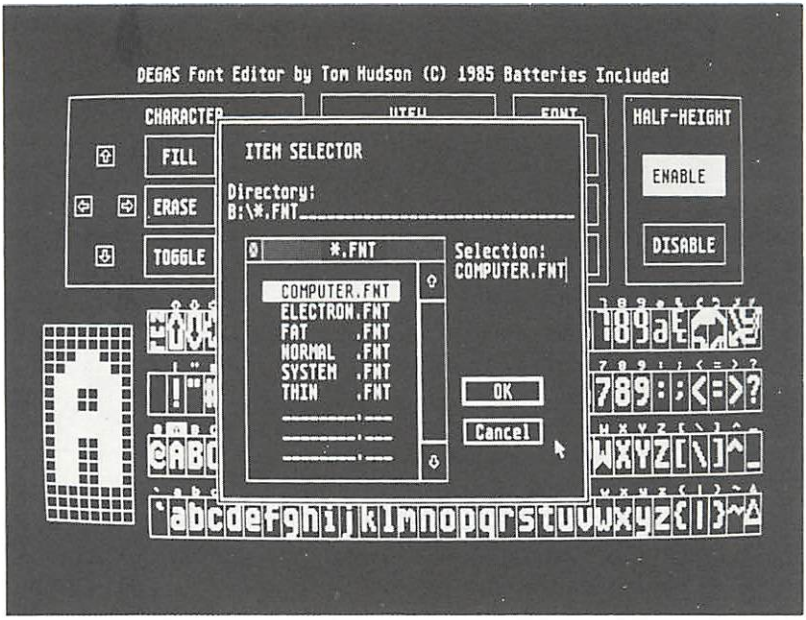
At the top of the screen you'll see several boxes—view, character and font—which hold all of the font editor features. You select a feature by positioning the cursor in the box and pressing the left mouse button. Several of these features may also be activated by function or keyboard presses.

User defined fonts have six sizes, listed below. The system font has only five. Your user-defined fonts work exactly the same as the system font as far as text goes.

6.1 Loading a Font

The default font in DEGAS is the ST's 'system font' which can't be edited. When you run FONTEDIT.PRG, you have a new, blank set of characters with no definitions. You can create a new font for your own use or you can load a font from disk and edit a part or all of it.

Font editor load selector



If you want to edit or change a font file on disk, select the load box in the font box or press the F8 function key. You'll see a directory of files with the .FNT extension. Select the file you want with the mouse cursor then click on the OKAY box to load it. You can then alter or edit that font. Selecting the erase box completely clears out the current font and gives you back a blank font to work with.

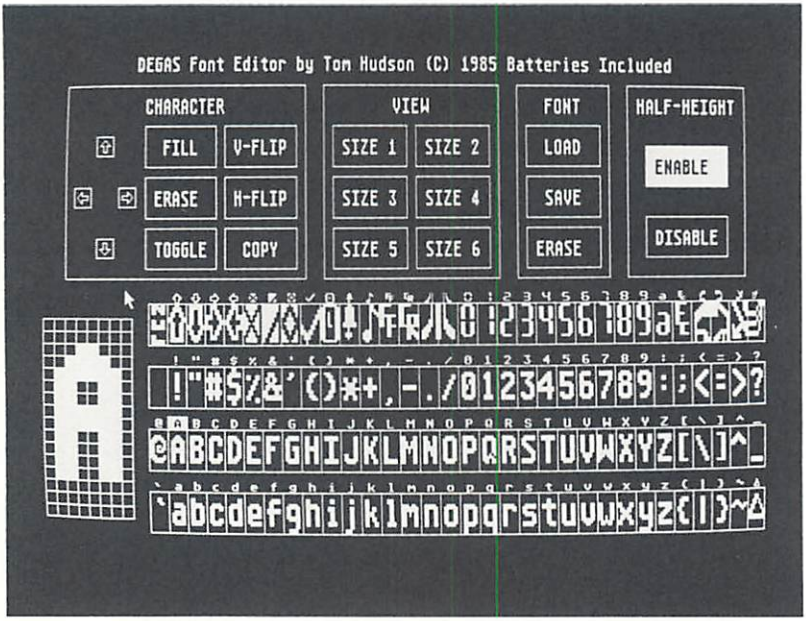
6.2 Editing a Font

You can edit the characters shown at the bottom of the screen—the default blank or empty font or characters from a loaded font. A character set can be text, graphics, special symbols—almost anything you can imagine. You can use a character set to create terrain for a game, for international characters such as Greek or Russian, for mathematical symbols or more.

First, move the cursor over the character you want to edit and press the left mouse button. This loads that character into the grid at the lower left (16 pixels high by 8 wide). Now you can edit that character. Use the mouse to move the cursor and turn on or off the pixels in the grid

exactly as you do in the fill pattern editor. The font pixels are simply on or off—black or white—color has no effect. You choose a font color from the palette in DEGAS' menu screen.

14: Font editor menu screen



The editing features are all shown in the character box. The **arrows** move an entire character one pixel in that direction (or use the keyboard arrow keys below the UNDO key). **Fill solid** (or the INSERT key) turns on all pixels in a character. **Erase** (or the CLR/HOME key) erases (turns off) all pixels. **Toggle** 'flips' pixels; switching on for off and vice versa. These work just like fill, erase and toggle options in the fill pattern editor in DEGAS.

Vflip and **Hflip** flip a character vertically (top to bottom and vice versa) or horizontally (left to right), mirroring its shape along the chosen axis. **Copy** lets you copy one character to another. You'll be prompted to select the character you want to copy—move the cursor to it and press the left mouse button—and which character you want to copy it to—use the same process. The right mouse button cancels the copy if pressed before you press the left button. The UNDO key restores the character you're working with and cancels your changes to it.

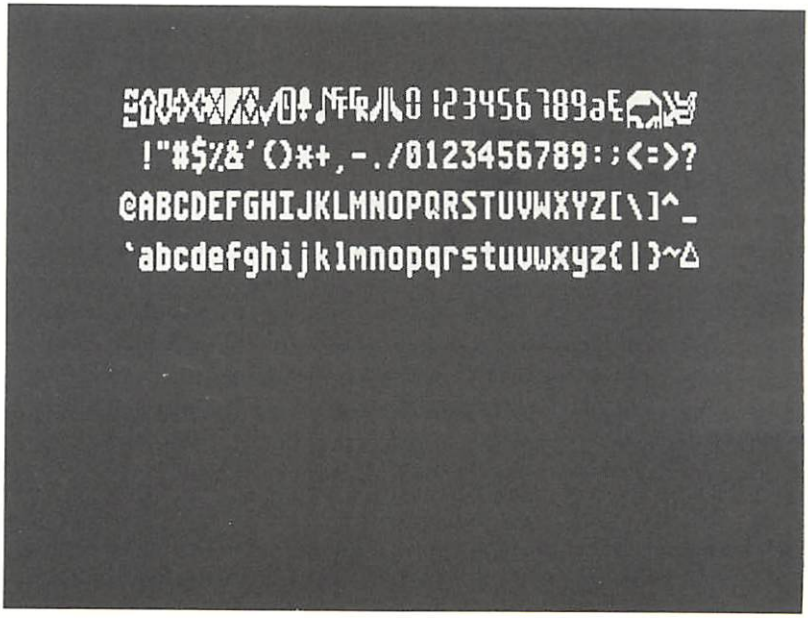
The view box lets you see your font in the various heights and widths on a separate screen (you can also use the function keys to display the font):

Font size:	Pixel size	Function key
1: half height,normal width	8 by 8	F1
2: half height,double width	8 by 16	F2
3: normal height and width	16 by 8	F3
4: normal height,double width	16 by 16	F4
5: double height,normal width	32 by 8	F5
6: double height,double width	32 by 16	F6

To return to the editing screen, press either mouse button.

Half-height mode must be enabled first in order to make the first two sizes readable (the default mode). The half-height mode uses every other row of pixels in the character, starting at the top. To disable the half-height mode select the disable box (or press the F7 function key). The status of the half-height mode is displayed in the box at the top of the screen. Also, if disabled, the text sizes one and two will appear in half-intensity in the view box. In order to see the first and second sizes, the half-height mode must be enabled.

15: Sample font viewed



If your font won't be readable in half-height modes, disable the half-height feature by selecting the box or pressing F7. This means your font will only have four sizes. When you save a font, the half-height switch is saved with the file so DEGAS knows whether or not the font can be displayed in that size.

6.3 Saving a Font

To save the font you've been working on to disk, select the save box in the font window (or press the F9 function key). You'll be given the directory window' you can select a font from the window with the mouse or type in a new file name. Saving and loading fonts work exactly like saving and loading pictures. You don't have to type the extension; DEGAS does it automatically. The half-height switch (see above) is saved with the font.

6.4 Erasing a Font

The erase box in the font window is used to completely clear a font, leaving you a blank character set to work with. You'll be asked to confirm this when you select it.

6.5 Exiting the Editor

Press the F10 key when you're ready to quit. This returns you to the desktop screen in GEM. You can then run DEGAS and load your new font into the system by selecting the 'load font' box in the menu screen.

6.6 System Font

The default GEM font is called the 'system' font. It can be returned to in DEGAS by loading the file 'SYSTEM.FNT' as a font. You cannot edit this file with the font editor program, but you can load it to restore the system font to DEGAS. To restore a blank font to the editor, use the erase feature. Remember that when you load a font, it doesn't change any text already entered on the screen, only the text which is about to be entered.

SHOWING YOUR PICTURES

A special little program has been included with DEGAS called SHOWPIC.PRG. This is an automatic picture display program which will cycle continuously through all of the DEGAS pictures on a disk. Double click on the SHOWPIC.PRG icon to run this program.

Showpic is intelligent; it knows the type of monitor you're using; it will only display high-res pictures on the monochrome screen and both low and medium (in the same show!) on the color monitor.

Showpic runs by itself, cycling endlessly through the available pictures for display. Each picture is shown for four seconds—the time it takes to load a picture—unless you change the time. To alter the viewing time, press the function keys:

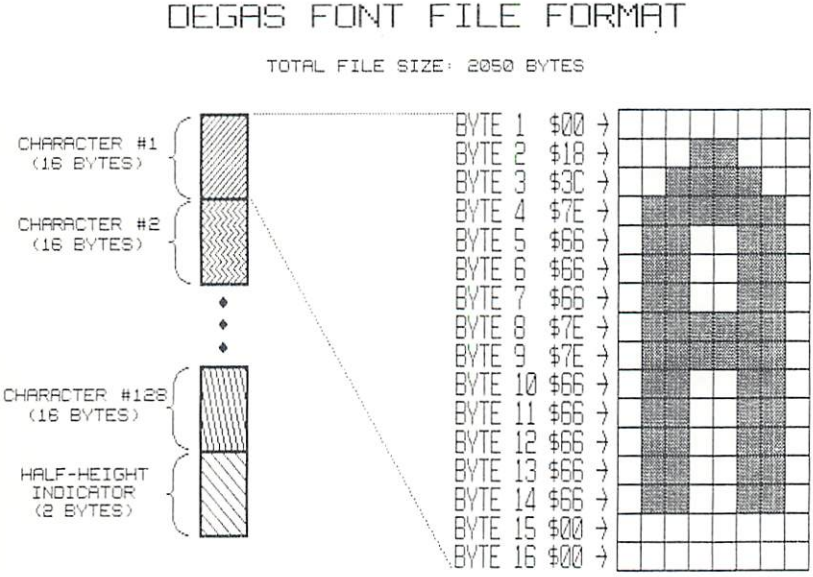
Key	Time
F1	4 seconds
F2	8 "
F3	12 "
F4	16 "
F5	20 "
F6	24 "
F7	34 "
F8	44 "
F9	54 "
F10	64 "

The space bar pauses a picture and holds it until pressed again. RETURN quits the program and puts you back in the GEM desktop.

TECHNICAL INFORMATION

DEGAS font file format

DEGAS is designed to use a special font file, created by the DEGAS FONTEDIT program. Figure 1 shows the structure of the font file.



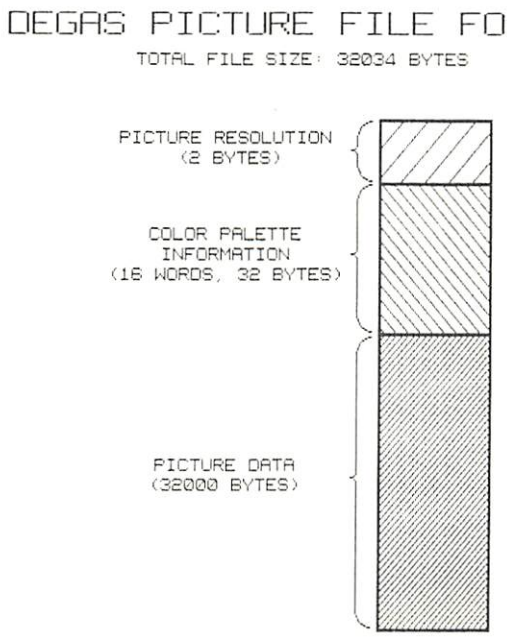
The first 2048 bytes of the font file are divided into 128 groups of 16 bytes. Each set of 16 bytes make up a character, as shown in Figure 1 with the letter A as an example. The 16 bytes of the characters are stored from top to bottom.

The last two bytes of the font file are a WORD value indicating whether or not the font may be scaled to half its normal height. If this value is zero, the font may not be scaled, resulting in a font that may be set to four sizes. If the value is 1, the font may be scaled to half-height, giving a six-size font. This flag is set in the FONTEDIT program by clicking on the HALF-HEIGHT ENABLE or DISABLE boxes.

The SYSTEM.FNT file is a "dummy" file that contains no font data. When this font file is indicated in the DEGAS "LOAD FONT" function, DEGAS switches to the ST's built-in font. Do not attempt to change the SYSTEM.FNT file.

DEGAS picture file format

Since DEGAS can store pictures created in all three screen resolutions used by the ST, the picture file format has been designed to indicate which resolution the picture was created in. This file format is shown in Figure 2.



The first two bytes of the picture file are a WORD value which indicates the resolution of the picture. If this value is zero, the picture was created in low resolution (320 × 200, 16 colors). If the value is 1, the picture was created in medium resolution (640 × 200, 4 colors). If the value is 2, the picture is high resolution (640 × 400, monochrome).

Any other value in these bytes will result in an error message when the file is loaded.

The next 32 bytes of the file contain the sixteen WORD values which make up the color palette of the ST. The first WORD value is the color setting for color #0, the next is the setting for color #1, and so on. All 16 color words are stored regardless of the resolution.

The final 32000 bytes of the picture file are the picture data, and are read directly into the screen RAM. All three graphics modes on the ST use the same amount of screen RAM.

Printer drivers

If you are an EXPERIENCED machine-language programmer, you may wish to write a custom printer driver for a particular printer or plotter. DEGAS furnishes all the information necessary for a printer driver routine to print the picture. You can even write a driver that works with a color printer or plotter, with either the RS-232 port or the Centronics (R) printer port.

The printer driver file itself must be a position-independent, executable 68000 machine language code. The file must be 2000 bytes in length (if your routine is shorter than 2000 bytes, pad the end of the file with zeroes).

In order for the printer driver to be able to carry out its function, DEGAS provides five pieces of information:

1) Printer driver command
2) The screen resolution
3) The base address of the screen
4) The address of the color palette information
5) The address of a 1280-byte work area

Printer driver command

The printer driver command is a WORD value which may contain two different values, which indicate the function the driver is to perform.

If it contains zero, the printer driver is to set up the data values it needs, then initialize the printer or plotter. If the initialization was

successful, the driver should return the number 1 in register D0.W. If the initialization was unsuccessful (if the printer or plotter was not ready, for example), the driver should return a zero in D0.W. No other values should be returned. The initialization will ALWAYS be executed before the dump function.

If the printer driver command is a 1, the driver is to perform the screen dump function. The driver must examine the screen RAM, extract the pixel information, convert it into a format that the printer or plotter can use, then send it to the printer or plotter via the Centronics (R) parallel port or the RS-232 serial port. The driver should perform a status operation before each byte is sent to the printer or plotter to be sure the device is ready to receive the data. If the device is not ready after a reasonable timeout period, the driver should return with a zero in D0.W, indicating that an error has occurred.

During the screen dump operation, the driver should check the keyboard periodically to see if the user has pressed the UNDO key. If the undo key is pressed, the user wants to abort the screen dump function. Stop all output and return with the number 2 in register D0.W to indicate that the dump was aborted.

If the screen dump terminates normally, return with D0.W equal to 1.

Screen resolution indicator

This is a WORD value which indicates the resolution of the picture to be dumped. A zero in this indicator means that the picture is a 320 × 200, 16-color picture. The number 1 in this indicator means that the picture is a 640 × 200, 4-color picture. The number 2 means that the picture is a 640 × 400, monochrome picture.

Screen base address pointer

This LONG value is the starting address of the memory used to store the picture information. This block of memory is always 32000 bytes in length. All pixel addresses must be calculated from this address.

Color palette pointer

This LONG value is the starting address of the color palette information. The color palette consists of sixteen WORD values which contain the RED, GREEN and BLUE color settings for each color register.

Work area address

This LONG value is the starting address of a 1280-byte work area reserved for the printer driver's use. Since the driver must operate at any point in system memory, this address provides a safe, convenient area of memory to store tables, pixel information, data buffers, etc.

Other information

The printer driver is called with the C language statement:

PRINT(COMMAND,REZ,SCREEN,PALETTE,WORKAREA)

Upon entry into the driver, the variables may be found at the following locations relative to the stack pointer (A7):

COMMAND:	4(A7)
REZ:	6(A7)
SCREEN:	8(A7)
PALETTE:	12(A7)
WORKAREA:	16(A7)

The printer driver should save all registers (except D0) upon entry and restore their contents before returning.

Commented examples of 68000 printer driver source code may be found in the Data Library of the Atari Special Interest Group (SIG) on the Compuserve Information Service.

ALL ABOUT . . .

TOM HUDSON

Tom Hudson is an independent software developer, specializing in the Atari ST computer line. He has worked with systems ranging in size from single-board microcomputers to mainframes, but prefers working with graphics-oriented micros. The head of programming at ANALOG Computing Magazine from 1982 to 1985, he currently resides in Mission, Kansas. DEGAS is his first, but certainly not last, ST software application.

IAN CHADWICK

Ian Chadwick went out to buy a sports car one afternoon in 1977 and returned home with a microcomputer instead: a TRS-80 Model 1. It didn't have a stick shift, mid-body engine, twin bucket seats made of leather or a nifty red paint job, but it didn't matter. Within a short time, the computer had all the disk drives, memory and expansion boxes it could handle, not to mention an interior filled with dubiously soldered home-made modifications.

In 1981, mesmerized by a demonstration of Star Raiders in a local shop, he bought an Atari 400. Out went the TRS-80, the disk drives, the expansion boxes and the wife, who – having had enough of this nonsense and tired of being a computer widow – packed up and moved about 6,000 miles away. Within a few weeks, the 400 had become an 800 with 48K, disk drives, expansion boxes . . . you know how it goes.

During a period of unemployment in 1982, he wrote *Mapping The Atari*, published by Compute Books in 83. Continued writing led to editing *InfoAge*; a Canadian computer magazine. He has since contributed to several computer magazines and newspapers and was trade book and software editor for Holt, Rinehart & Winston.

Ian is a contributing editor to *Antic* and *Strategy & Tactics* magazines, sometime speaker at user and other groups and frequent documentation writer for Batteries Included. He has several writing projects on the go, including a book on guitars, one on the Atari ST and a dictionary of Go terms. In his spare time, he also works as software marketing manager for McGraw-Hill Ryerson

Today, he has a new, more understanding and prettier wife. They have six cats to whom he has been teaching BASIC in his spare time without much success. One day he hopes to be able to finish a political-historical simulation he began writing when he first bought his TRS-80.

DEAN MOTTER

When he first came to Toronto from Ohio, he worked extensively in animation and illustrating children's books which eventually, somehow, took him to CBS Records Canada.

There he served as design director for nearly three years, creating all the promotional and advertising material for CBS domestic as well as foreign acts. This included designing covers for such acts as LOVERBOY, LIONA BOYD, and TEENAGE HEAD.

After a few years, he left CBS and started his own firm, DIAGRAM STUDIOS, which handled clients pretty well restricted to the entertainment field including the record companies; A&M, Capitol, CBS, MCA, RCA, WEA and others.

DIAGRAM STUDIOS handled everything from "country and western" to heavy metal. some of the acts include; The Nylons, Leroy Sibbles, Long John Baldry, Spoons, Jane Siberry, Battered Wives, Honeymoon Suite, The Bop Cats, The Rugrats, The Irish Rovers, Triumph, Hagood Hardy, Frank Mills, Anne Murray, Motorhead, Lee Aaron, Family Brown, Toronto, Sesame Street, Chilliwack, and many others.

In 1984 he formed a new studio; MODERN IMAGEWORKS. This new company, aside from employing a larger staff, handles a broader spectrum of creative work in the entertainment field which includes designing software packages for Batteries Included, having recently completed new packages for Paperclip, The Consultant, Keys to Typing, Portfolio and DEGAS.

He is currently involved in Canada's best selling comic book, MISTER X. as creator, writer and designer of the book.

Dean Motter has won two 'Juno' awards for album design. A Juno is the Canadian equivalant to a U.S. 'Grammy' Award.

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Fill in this entry form and include your **DEGAS** drawing(s) on a 3 1/2 disk. As the purchase of the **DEGAS** program is required for entry, a facsimile or reproduction of this entry form will **not** be accepted.

Mail entry to:
DEGAS Art Competition
Antic Magazine
524 Second St.
San Francisco CA 94107

Please direct **all contest enquiries** to:
Batteries Included
30 Mural Street
Richmond Hill Ontario
Canada L4B 1B5

Only one entry (disk) per person will be accepted, with a maximum limit of five illustrations per disk. **Entries must be received by midnight, March 31, 1986**, the competition closing date, to be eligible. To win, you must comply with the competition rules.

Competition Rules:

- Entry forms must be completed in full to be valid. No responsibility is assumed for late, lost or misdirected mail.
- This competition is open to registered owners of the **DEGAS** software program from Batteries Included, only. All prizes will be awarded. Prizes are non-transferable and not redeemable for cash. No substitution of prizes is permitted. Prizes to consist of: * two first prizes of: 1) $500 cash; 2) choice of any three software packages from the latest Batteries Included software catalog; 3) choice of any three Antic software products, from the Antic catalog; 4) one year subscription to Antic magazine; 5) publication of the winning illustration in Antic magazine. or * five consolation prizes of: 1) two software packages; a choice of one software package from the catalog of Batteries Included and one Antic software package from the Antic catalog; 2) one year subscription to Antic magazine; 3) Publication of the winning illustrations in an issue of Antic magazine (total approximate value of the competition $2,000)
- Winners will be notified by mail, and must claim their prize within 30 days or an alternate winner will be selected. Prizes won by a minor will be awarded to the winner's parent or legal guardian. For a list of winners, send a stamped, self-addressed envelope to, **DEGAS** winners, Antic Magazine.
- All federal, state, provincial, and local taxes will be the responsibility of the prize winner. Winners may be required to execute an affidavit of eligibility and release.
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- Selection of winners will be conducted by Antic Publishing Inc. whose decision will be final. No correspondence will be entered into, and all entries become the property of Batteries Included and Antic Publishing.
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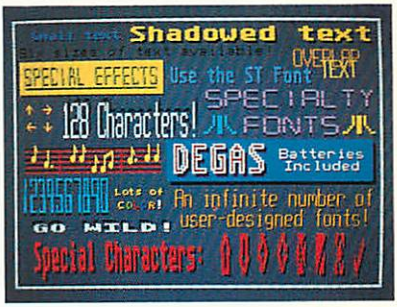

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